UNIT II

RCM PROCESS

Module 3

HARDWARE PARTITIONING

HARDWARE PARTITIONING

Module Preview:

Introduction

- **Introduction**
- **Hardware Partition**
- **Exercise**
- **Review and Summary**

HARDWARE PARTITIONING

Module Objective:

Introduction

This module will:

- **Provide an introduction to the concept of Hardware Partitioning**
- **Demonstrate how to develop a Hardware Partition**
- **Show how performing RCM at different levels affects the analysis.**

RCM Process

Partitioning

PLANNING AND PREPARATION

1. Identify Team and responsibilities
2. Identify analysis items
3. Prioritize Items
4. Identify and document Review Process
5. Orientation/Training
6. Ground Rules and Assumptions

ANALYSIS

1. Equipment Kick-off Meeting
2. Initial Data Gathering
3. **Hardware Partition**
4. Function
5. Functional Failure
6. Failure Mode
7. Failure Effects
8. Failure Consequences
9. Task Evaluation
10. Task Selection

IMPLEMENT RESULTS

1. Package Maintenance Task
2. Implement Other Actions

SUSTAIN

1. Emergent Issues
2. Age Exploration
3. Hardware Changes
4. Trend/degrader analysis
5. Document Reviews

Results

- Analysis Approach/ RCM Plan
- Maintenance Requirements
- Maintenance Program
- Data

HARDWARE PARTITIONING

Definition:

Partitioning

For the purposes of this course:

The terms “Asset”, “Hardware”, and “Item” are used interchangeably to describe the equipment under analysis

HARDWARE PARTITIONING

Definition: ***Partitioning***

HARDWARE PARTITION

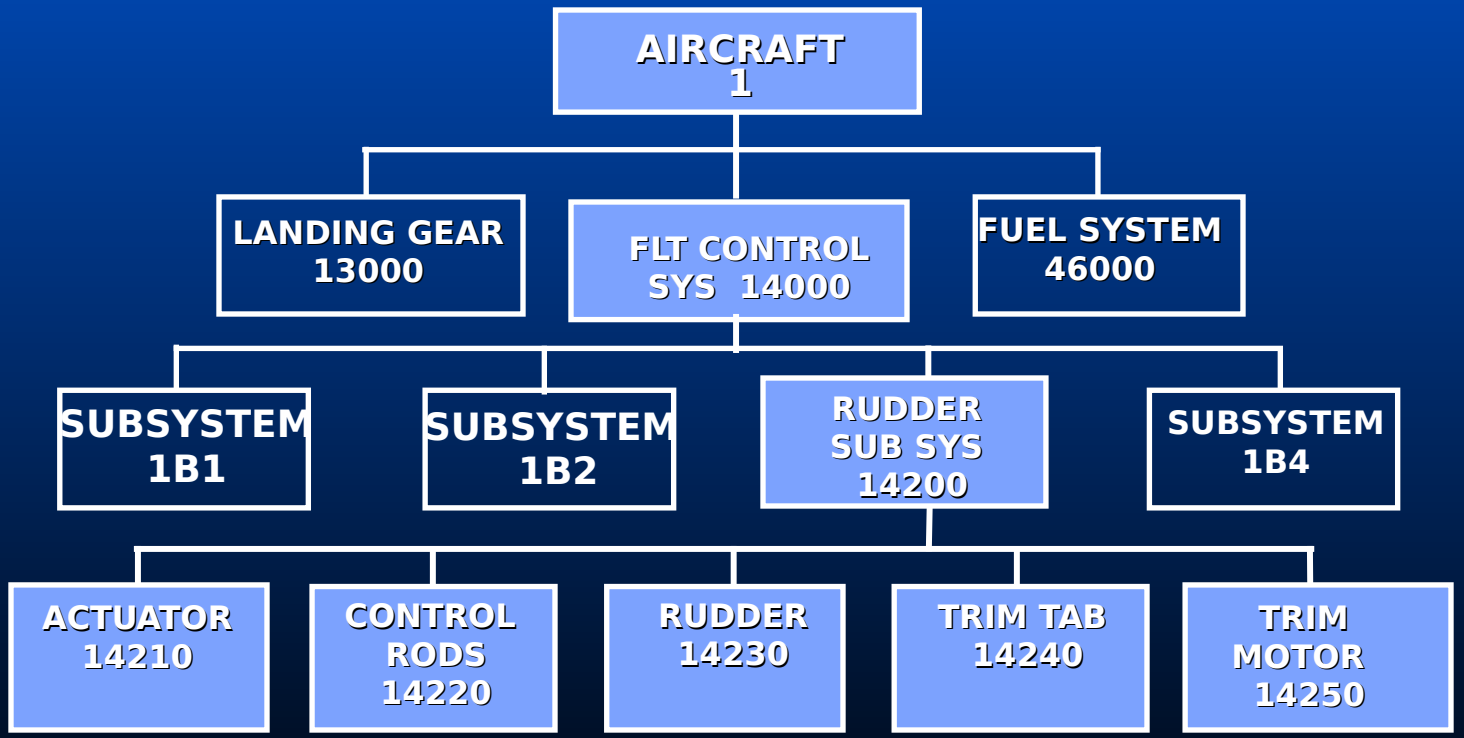
A logical hierarchical division of an asset into progressively lower levels to show relationships among systems, subsystems, components, etc.

Also called EQUIPMENT HIERARCHY or HARDWARE BREAKDOWN

HARDWARE PARTITIONING

Aircraft Example:

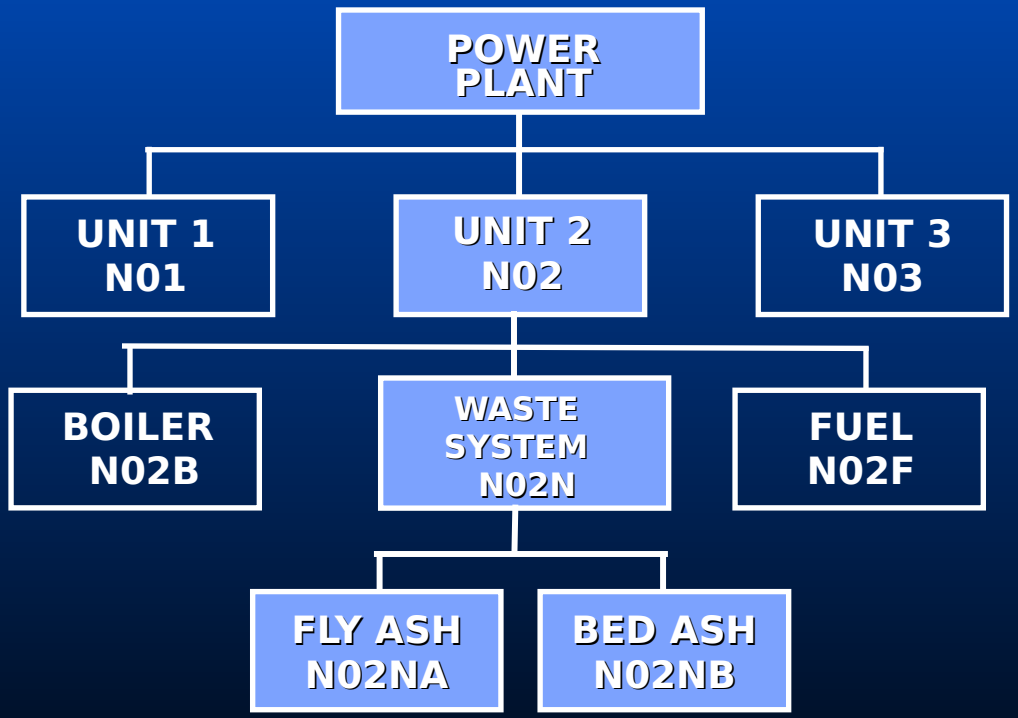
Partitioning



HARDWARE PARTITIONING

Power Plant Example:

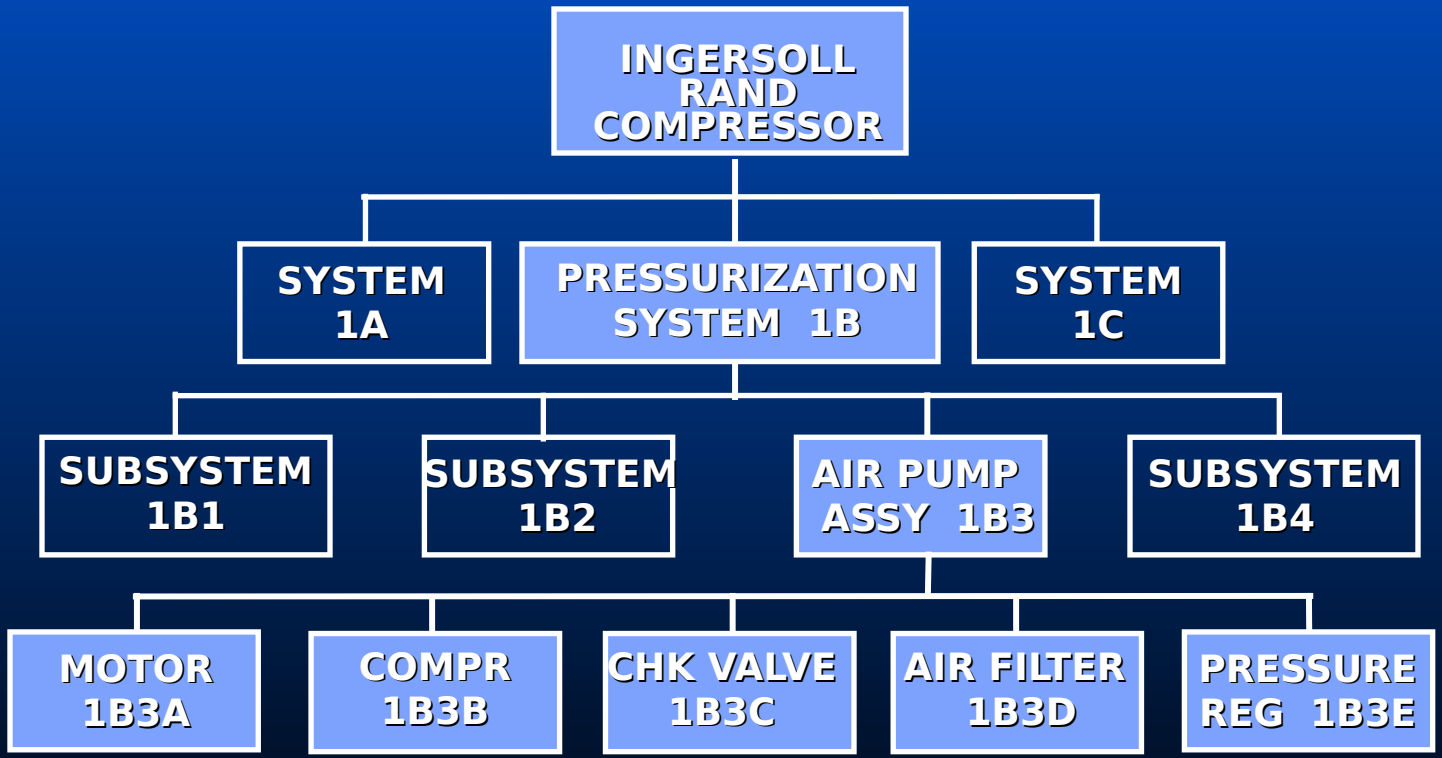
Partitioning



HARDWARE PARTITIONING

Air Compressor Example:

Partitioning



HARDWARE PARTITIONING

Considerations :

Partitioning

Partition may use any logical system:

- **CMMS**
- **Work Unit Code**
- **Maintenance/Operators manuals**
- **OEM Parts breakdown**
- **Physical boundaries**

HARDWARE PARTITIONING

Considerations :

Partitioning

Hardware Partitioning Considerations/Suggestions:

- **Must be a physical partition:**
  - Each item should only be in one branch of the hierarchy
- **Consider how failure data is recorded**
- **Manuals may provide logical divisions of equipment**
- **Boundaries should be clearly identified:**
  - List specific valves, terminal blocks, etc. that end one system and begin another
  - Boundaries should take into consideration functions of equipment
  - General boundary statements can be used
- **Be prepared to adjust boundaries:**
  - During an analysis, better partitioning may become evident, especially when defining functions
- **Partition one level below where the analysis will be performed:**
  - Provides helpful information during the analysis

HARDWARE PARTITIONING

Identification: ***Partitioning***

Hardware Partition should include a Numbering or Identification System

- **Uniquely identifies each system, sub-system, etc.**
- **Should identify relationships between parent and child items**
- **Can use existing system or create a new one:**
  - **CMMS scheme**
  - **Equipment Identification Numbers**
  - **Military: WUC, Logistics Control Number, etc.**

HARDWARE PARTITIONING

Level of Analysis: ***Partitioning***

What level to perform RCM analysis?

- **System or Subsystem level is usually the best starting point**
- **Complexity or other factors may warrant a lower or higher level**
- **Different levels can be used within same analysis**
- **Consider on-equipment maintenance level**

HARDWARE PARTITIONING

Level of Analysis:

Partitioning

System/Subsystem Analysis:

- **Most efficient for a large scale analysis effort**
- **Reduces number of functions to identify**
- **Secondary functions are easier to identify**
- **Aids in proper effects determination**
- **Aids in identification of “significant” failure modes**
- **Allows combination of failure modes where it makes sense**
- **Helps focus maintenance tasks on preservation of system/end item operation**

HARDWARE PARTITIONING

Level of Analysis: ***Partitioning***

Component level analysis:

- **Most effective for limited analysis of a few specific hardware items or failure modes**
- **Also useful for analysis of components used on multiple systems**

HARDWARE PARTITIONING

Boundaries/Interfaces :

Partitioning

Hardware partition should provide boundary definitions that eliminate confusion over what is/is not included in analysis

Examples:

- **Piping or tubing**
- **Controls**
- **Air or water supply sources**
- **Brackets, fixtures, or attach points**

HARDWARE PARTITIONING

Exercise | ***Partitioning***

Class Exercise

Objective:
Perform a End Item Hardware Partion for a Coffee Maker

Exercise

- COFFEE MAKER 1
  - BREWING SYSTEM 1A
    - FILTRATION SUBSYSTEM 1A2
    - WATER RESERVOIR SUBSYSTEM 1A1
    - CARAFE SUBSYSTEM 1A3
  - ELECTRICAL SYSTEM 1B
    - PWR SWITCH SUBSYSTEM 1B1
    - CLOCK PROGRAMMER SUBSYSTEM 1B2
    - WATER HEATING SUBSYSTEM 1B3
    - HOT PLATE SUBSYSTEM 1B4

HARDWARE PARTITIONING

Review and summary

Module Objective

Provided an understanding of the Hardware Partitioning Process.

Introduction

Learning Objectives

Hardware *Partitioning*

- **Definition**
- **Identification**
- **Considerations**
- **Level of Analysis**
- **Boundaries & Interfaces**

Exercise

End of Module

up next.....

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